

CLAIMS

1. An electrolytic solution comprising an organic polar solvent (C) and further comprising a carboxylic acid (A0) and/or a carboxylate salt (B), wherein the carboxylate anion (A) is one with which the energy of formation in water of the ionic complex (D) with aluminum ion is not more than -250 kcal/mol and not less than -500 kcal/mol as calculated by the MM3/PM3 method of the CAChe system.

2. The electrolytic solution of claim 1 wherein the van der Waals volume of the carboxylate anion (A) is not less than 190 cubic angstroms and not more than 500 cubic angstroms.

3. The electrolytic solution of claim 1 or 2 wherein the modulus of the difference between the solubility parameter as calculated by Fedors method for the carboxylate anion (A) and the solubility parameter for the organic polar solvent (C) is not less than 4 and not more than 9.

4. The electrolytic solution of one of claims 1 to 3 wherein the maximal electron density of the highest occupied orbital of the molecule of the carboxylate anion (A), as calculated by the MM3/PM3 method of the CAChe system, is not less than zero and not more than 0.5.

5. The electrolytic solution of one of claims 1 to 4 wherein the carboxylate anion (A) is a secondary dicarboxylate dianion.

6. The electrolytic solution of one of claims 1 to 5 wherein the carboxylate anion (A) is represented by the following general formula (1)



wherein X is a linear or branched, saturated or unsaturated, divalent hydrocarbon group having 1 to 12 carbon atoms, and may have an ether bond,

R₁ and R₂ are linear or branched, saturated or unsaturated, monovalent hydrocarbon groups having 2 to 10 carbon atoms wherein R₁ and R₂ are different from each other, or R₁ and R₂ are monovalent hydrocarbon groups having an ether bond and having 2 to 10 carbon atoms wherein R₁ and R₂ may be the same or different from each other, or

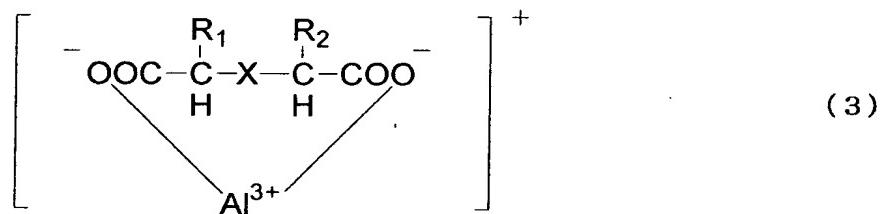
by the following general formula (2)



wherein Y is a linear or branched, saturated or unsaturated, divalent hydrocarbon group having 1 to 12 carbon atoms, and may have an ether bond,

R₃ and R₄ are linear or branched, saturated or unsaturated, divalent hydrocarbon groups having 2 to 10 carbon atoms, and may have an ether bond, wherein R₃ and R₄ may be the same or different from each other.

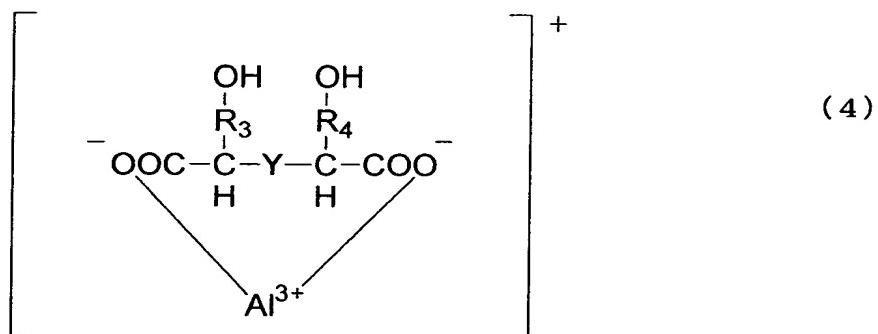
7. The electrolytic solution of one of claims 1 to 6 wherein the ionic complex (D) formed from the carboxylate anion (A) and aluminum ion is represented by the following general formula (3),



wherein X is a linear or branched, saturated or unsaturated, divalent hydrocarbon group having 1 to 12 carbon atoms, and may have an ether bond,

R₁ and R₂ are linear or branched, saturated or unsaturated, monovalent hydrocarbon groups having 2 to 10 carbon atoms wherein R₁ and R₂ are different from each other, or R₁ and R₂ are monovalent hydrocarbon groups having an ether bond and having 2 to 10 carbon atoms wherein R₁ and R₂ may be the same or different from each other, or

by the general formula (4),



wherein Y is a linear or branched, saturated or unsaturated, divalent hydrocarbon group having 1 to 12 carbon atoms, and may have an ether bond,

R₃ and R₄ are linear or branched, saturated or unsaturated, divalent hydrocarbon groups having 2 to 10 carbon atoms, and may have an ether bond, wherein R₃ and R₄ may be the same or different from each other.

8. The electrolytic solution of one of claims 1 to 7 wherein the carboxylate salt (B) is an ammonium salt and/or an amine salt.

9. The electrolytic solution of one of claims 1 to 8 wherein the organic polar solvent (C) is ethylene glycol.

10. The electrolytic solution of one of claims 1 to 9 to be used in an electrolytic capacitor.